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THE PLANT DISEASE REPORTER

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Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY

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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

Vol. XXIV Number 4

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VIRUS DISEASES OF THE STONE FRUITS [1]

K. Starr Chester

Disease	Symptoms	
	Fruit	Leaves
Peach [Amygdalus persica] Yellows, 1791 [E.F.Smith, 1888].	Premature ripening, abnormally large, watery, insipid flavor, often speckled with red or misshapen. Red streaks in the flesh.	Small, yellow, often spotted with red, folded upward, and curled back in the form of a claw or hook.
Phony Peach, 1886 [Neal, 1920. Hutchins, 1933]	Undersized, and small crop, but well formed with good color.	Unusually rich and healthy appearing. Blade abnormally flat.
Peach Rosette, [E.F.Smith, 1891].	None produced when tree is entirely affected.	Dense clusters of small yellowish-green leaves at tips of twigs.
Little Peach, 1893 [E.F. Smith, 1898].	Undersized, late in maturing (10 days or more). Insipid flavor, often stringy. Not discolored. Often rectangular shape.	Light to yellowish-green. Leaves rolled and drooping.
Red Suture Disease of Peach, [Bennett] 1926.	Ripen prematurely on one side, usually the crease side. Fruits bumpy, often with reddened ridges; easily crushed.	Tree yellowish-green or bronzed. Leaf tips pale, curled downward.
Peach Mosaic, 1931 [Hutchins, 1932].	Variegated flowers; fruit bumpy, mostly on crease side, protruding tip, no constant discoloration, often late ripening. Flesh more or less normal.	Yellowish variegation in spring, often preceded by paling of the veins. Some tendency to clusters of leaves at tips of twigs. (Rosetting).

[1] This table of basic data on the stone fruit viruses has been issued as Mimeographed Circular No. 51, dated January, 1940, of the Agricultural Experiment Station, Oklahoma A. & M. College, and is reproduced here by permission of the author. The arrangement of the viruses is in chronological order of discovery. These dates usually do not coincide with the dates of first publication, hence the latter have been inserted so as to preserve correct citations for synonymy.

Habit	Range	Quarantines*	Comments
Upright wiry shoots with upright side branches. Premature development in spring.	Eastern Tex. to S.C. and northward to Lake States and Canada.	Ariz., Calif., Idaho, Ore., Wash.	Also occurs on apricot, almond, nectarines, plums, and possibly cherries. +N.B.
Stunted and bushy due to very little new tip growth.	Maryland to Mo., Ark., and Texas and southward. Three trees found in Okla. in 1932.	Ill., Miss., Okla., R.I., Canada. Federal eradication	Possibly the same as yellows, with the virus restricted to roots and eliminated from top of tree by summer heat in southern States. +
Current year's growth very short (2"-3").	S.C. to Kans. and Okla. and southward.	Ariz., Calif., Wash.	Marianna plum [P. cerasifera] is immune, but other plums, apricots and cherries susceptible. +
No wiry, upright shoots as in yellows. Trees decline in vigor, and die after about four sickly years.	Approximately the same as peach yellows.	Calif.	Little peach has been shown to be a milder type of peach yellows. +
New shoots short, and abundant along the main stems, giving the tree a feathery appearance.	Mich., Md.	None	+
Tree thin in summer, internodes irregularly long and short, abnormal number of short side spurs or branching at tips of twigs.	Okla., Texas, N.M., Colo., Old Mexico, Ariz., Calif., Utah.	Okla., Colo., Utah. Federal eradication program.	Maynard Plum [P. salicina] is a carrier of the virus. 0

N.B.: + indicates budwood may be sterilized by heat; 0 indicates that this can not be done.

* Georgia and Idaho have general peach quarantines, not specifying particular virus diseases.

cf. p. 132

Disease	Symptoms	
	Fruit	Leaves
Plum [P. salicina] Mosaic. [Valleau] 1932.	Bumpy with raised dark red spots which ripen earlier than remainder of fruit.	Showing a variety of pale ring and line patterns or yellowish oak-leaf design.
Peach X-disease (Yellow-red virosis). 1933 [Stoddard, 1938].	Shrivel and fall soon after leaf symptoms appear, or remain as mummies on the tree. In milder cases fruits ripen prematurely, are bitter, and contain no pit.	Brilliant red on chokecherry. On peach, normal in spring, later yellow patches and red spots on leaves, which fall out, leaving ragged appearance. Early defoliation except for tip leaves of affected shoots.
Peach Asteroid Spot. 1934 [Cochran & Smith, 1938].	Not known, because disease is not found on fruiting branches.	Leaves spotted with small, star-like, light green blotches. Later leaves yellow with greenish blotches, and prematurely shed.
Cherry [P. cerasus] Pink Fruit. 1934 [Pink Cherry, Internal Necrosis. Heald, Jones & Huber, 1934. Pink Fruit. Reeves, 1939].	Fails to mature properly, small, insipid, or bitter. Internal and external dead areas. Fruits abnormally pink, later brown, "buckskin" color.	
Cherry [P. avium] Buckskin. 1936 [Rawlins & Horne, 1931].	Fruits cone shaped, shrivel before maturity with short stems and a dull "buckskin" appearance.	In autumn, reddening along base of midrib, extending out into veins. No yellowing or mottling.
Prunus [P. domestica] Virus 6. [Thomas & Hildebrand] 1936.	Very few fruit mature, but these are normal.	Small, narrow, glazed, hairless, wrinkled, thickened. Edges very irregular in outline.
Cherry [P. cerasus] Chlorosis. [Keitt & Clayton] 1939.	Few fruits formed. These are large, not bumpy nor having dead areas.	Older leaves yellow and begin dropping about 3 weeks after petal fall.

Habit	Range	Quarantines	Comments
Tree weakened but not dying promptly. Evidently not epidemic.	:Kentucky	:None	:Occurs as a nursery disease. Also attacks peaches.
Often only part of a tree affected. Trees continue to develop normally in the spring, followed by leaf symptoms and crop failure, but rarely die.	:Mass., Conn., R.I., N.Y., Vt., Ill., Utah? on P. demissa. Colo.?, Wis., Idaho?	:Under consideration in a number of Eastern States.	:Wild chokecherry (P. virginiana) is a natural source of infection. Also on nectarine and all varieties of peaches. Readily involves entire orchards.
Not apparently epidemic.	:California	:None	:Occurs only on young shoots and nursery stock.
Late blossoming.	:Western Washington	:None	:Found only on the Montmorency cherry. Possibly a type of the "buckskin" disease.
Part of tree may be affected. Tree not killed but soon worthless.	:California	:None	:Sweet cherries on Mahaleb stocks escape the disease. Spreads rapidly in orchards.
Shoots very short. Often a normal shoot among severely affected buds.	:New York	:None	:Affects only plum and prune.
Twig growth normal but spur system reduced. Trees soon unprofitable.	:Wisconsin	:None	:On sour cherry. Formerly called "physiological yellow leaf."

Certain Obscure Virus (?) Diseases of Stone Fruits Not Included in the Table Because of Insufficient Information

1. Idaho peach disease. Reported in 1937, and by 1939 had spread alarmingly. Produces reddish and purplish discoloration of the leaves followed by a shot-hole condition of the leaves; dull reddish bark. Occurs on several varieties. Possibly identical with the "X-disease" of the East.

2. Idaho peach disease. 1939. Variegation of the leaves resembling peach mosaic. Is transmitted by grafting.

3. Idaho peach blister. 1939. Fruits with blisters at tip end, often involving half the fruit, misshapen, slightly dwarfed. Brown corky material on welts with gumming. Flesh unusually spongy and open due to gum pockets. Trees look normal or even greener than usual. All of the fruit on a tree are affected. The trouble, which has aroused much curiosity among growers, has not definitely been proven to be a virus disease.

4. Kentucky disease. 1939 [also reported in 1932]. Bumpy peaches, as in peach mosaic, but no leaf symptoms, and the disease could be carried year after year by nurserymen without recognition.

5. Cherry mottle leaf. Idaho, 1937. Not adequately described.

6. Peach stipple spot. A term frequently heard in the Southwest. No published information has been found, but the term evidently applies to a leaf variegation with small yellow spots, entirely distinct from peach mosaic.

7. Peach angular yellow spot. Numerous brilliant angular yellow patches on leaves in late summer. Distinct from peach mosaic and not definitely proven to be a virus disease. Affected trees yielded well. McCurtain County, Oklahoma, 1939.

[8. Crinkle of sweet cherry is also mentioned as occurring in Washington State in 1934.]

(Oklahoma Agricultural Experiment Station).

NOTES ON FRUIT DISEASES IN THE OZARK SECTION OF ARKANSAS IN 1939

John C. Dunegan

The combination of a spring frost, a serious outbreak of the apple scab disease and a late summer drought accompanied by excessively high temperatures, made the 1939 season far from ideal for fruit growing in northwest Arkansas.

Peach and plum buds began to swell early in March and by the end of the month early varieties of peaches were in full bloom and an occasional apple bud had started to separate from the clusters. A sudden drop in temperature on April 6 to 25° F. and on April 11 to 29° eliminated the peach and plum crops, and very materially reduced the size of the apple and cherry crops in northwest Arkansas. Injury to both apple and cherry blossoms was correlated with their development and was much more severe in orchards southwest of Fayetteville than in the Rogers area along the northern boundary of the fruit belt.

Many growers, discouraged by this repetition of the 1938 spring frost, delayed starting their spraying operations and scab lesions were present on the foliage before the first spray was applied to their trees. Unfortunately for these growers, an abundance of rain during May furnished ideal conditions for the scab fungus (Venturia inaequalis). The scab outbreak in 1939 equalled the outbreaks of 1935 and 1929 in severity.

The blotch fungus (Phyllosticta solitaria) also was more prevalent than in any of the past five seasons and added to the losses experienced by the growers.

Further losses were experienced late in August and during the first half of September when three weeks of abnormally high temperatures, coupled with a moisture deficiency which had developed during July and August, caused widespread dropping of the almost mature Collins Red, Stayman Winesap, and Grimes Golden apples before they had developed full size or normal color.

The full effect of the spring outbreak of the scab fungus on the apple leaves became apparent during this period of high temperatures. Widespread premature defoliation developed in the majority of orchards. This defoliation was so pronounced that rains during October induced new shoot growth and rather profuse blossoming in many trees.

Apple Diseases

Apple Scab (Venturia inaequalis): Immature perithecia on overwintered apple leaves were observed on February 18, 1939 but they matured very slowly and perithecia with colored ascospores were not found until March

28 following several days of rainy weather. Some discharge of ascospores may have occurred during the period March 26 to March 28 and additional rain on April 5 induced a further spore discharge.

Very small scab lesions were found on the young leaves on April 17 and the first fruit lesions were observed on May 9 on Ben Davis, Winesap and Delicious varieties which had not been sprayed.

Environmental conditions during April were only moderately favorable to the development and spread of the scab fungus. The weather conditions from May 8 to May 30 were, however, exceptionally favorable.

The combination of moderate temperatures and an abundance of rainfall during this period favored the development of numerous secondary leaf and fruit lesions. Further spread of the fungus during June was retarded by the advent of summer temperatures, although even during this month there were several periods of cool rainy weather which favored further secondary infections and the "scab season" did not come to a definite end until early in July.

In 1939 the scab fungus reached a degree of prevalence similar to that which it achieved in 1929 and 1935. The effect of the 1939 outbreak was not so important commercially as in previous years since many of the orchards had a small crop following the April 6 freeze. In properly sprayed orchards the losses were reduced to a minimum. In many orchards the growers, feeling that the size of the crop would not warrant any extensive spray operations, omitted the cluster bud application, and the small crop was further reduced in size by the dropping of the scab infected apples.

The abundance of rainfall during May and the adequate supply in June prevented to a large extent any serious defoliation during the early part of the season. Marked injury developed later in the season following the advent of hot, dry weather in July. Many trees were defoliated by the middle of September and produced new shoot growth and blossoms late in October. Properly sprayed trees retained their leaves until the end of October.

Apple Blotch (Phyllosticta solitaria): This fungus was quite prevalent in many orchards in 1939 and along with the scab fungus further reduced the value of the 1939 apple crop. It was readily controlled by the standard spray schedule in orchards which have been sprayed consistently during the past five seasons. However, many orchards had received no sprays containing copper in 1936 and 1938 following the spring freezes, and the commercial control of blotch in 1939 in these orchards was not entirely satisfactory. The value of routine spraying every year for blotch control was clearly demonstrated this season.

Cedar Rust (Gymnosporangium spp.): The "cedar apples" caused by Gymnosporangium juniperi-virginianae expanded following the rains of March 26 to 29. Germinating teliospores were noted on March 29.

Specimens of the G. juniperi-virginianae on Early Harvest apples were received from a grower near Mountainburg on May 10. He reported that a large portion of his crop was affected. Further reports and specimens were seen from time to time during the season and the disease was definitely more prevalent than in the past few years.

In October nurserymen at Rogers and Farmington reported that rust cankers were present on the twigs and main branches of certain of their 2-year-old material. An examination of the specimens indicated that Gymnosporangium juniperi-virginianae was the species involved, judging from the morphology of the aeciospores and the peridial walls. The cankers were more abundant on Early Red Bird trees than on any other variety but occasional specimens were found on the varieties Wilson June and Winter Banana. The infections on Early Red Bird were so numerous that one nurseryman has decided not to propagate this variety in the future, while another nurseryman reported that 185 trees (37 percent) of Early Red Bird in a planting of 500 had to be discarded owing to the presence of rust cankers.

No specimens of G. clavipes on the Delicious apple were observed during the 1939 season.

Black Root Rot (Xylaria mali): Fruiting bodies of Xylaria mali were observed June 15 around the bases of many of the trees which were found to be infected in the survey made in 1938. The young fruiting bodies were white; subsequently they developed the typical black color of the mature fruiting bodies. The orchard was resurveyed early in November when 5 new cases of black root rot were found. Eighteen trees had been found infected in 1938 and the additional cases in 1939 bring the total to 23 in this 36-year old orchard. Four of the 1939 cases were on trees adjacent to those which were infected in 1938.

In both years trees were recorded as being affected with black root rot only when fruiting bodies of Xylaria mali were found at their bases.

In a younger orchard (15 years old) on the same farm surveyed early in December a total of 9 cases of black root rot were found, 7 of which were in a localized area in the west side of the orchard. The other 2 cases were single trees on the fifth and eighth rows southeast of the main infected area.

In both orchards the majority of the black root rot cases occurred on the northeast slope of small knolls.

Peach Diseases

Peach Brown Rot (Sclerotinia fructicola): The first signs of apothecial development were noted on March 13 and expanding apothecia were observed on March 21. Peach buds were just beginning to open so that apothecial and blossom bud development were closely synchronized in 1939. One week later (i.e. March 28) Early Wheeler (Red Bird) and other early maturing peach varieties were in full bloom and fully expanded apothecia were observed throughout the orchard. No further observations were made for 1939 as the freeze of April 6 eliminated the peach crop in northwest Arkansas.

Bacterial Spot (Bacterium pruni): The spring frost eliminated the commercial peach crop in northwest Arkansas but excellent specimens of bacterial spot on the fruit were submitted from Alma, where, owing to the lower elevation, the fruit escaped frost injury. No specimens were received from the commercial peach section of the southwestern part of the State.

In northwest Arkansas the disease was very prevalent on the leaves and caused widespread defoliation in many orchards. The disease became prominent about May 15 and by the end of the month was producing marked leaf injury. One 20-acre block of 18-months-old Elbertas near Springdale had the most serious case I have ever encountered. The symptoms, which are described in detail elsewhere[1/] were most unusual in that the upper half of many of the leaves were completely infiltrated with bacteria, giving the leaves a "glassy" translucent appearance. The disease was more prevalent in two-thirds of the block where string beans had been grown between the peaches in 1938.

At the end of the growing season this 20-acre block was surveyed and the extent of defoliation was estimated for each of the 1796 trees in the block. The results (Table 1) show that the disease was present throughout the entire planting. The defoliation, however, was much more marked in the portion where the cover crop had been grown the previous season, thus confirming the observation made earlier in the season.

At the time this survey was made (October 10, 1939) other peach orchards of various ages in the Springdale area were also examined and in every instance very few leaves remained on the trees in those orchards where cover crops of cow peas or beans had been grown in 1939. The difference in appearance between these orchards and those where no cover crop had been grown was most striking. In the latter case the trees remained in full leaf until the first killing frost early in November.

1/ Dunegan, J. C. Unusual bacterial spot symptoms on peach leaves. Phytopathology 30:-88-89. 1939.

Table 1. Number and percentage of trees showing different degrees of defoliation due to Bacterium pruni in 18-months-old Elberta peach orchard.

Class	Extent of defoliation	Portion where beans were planted in 1938		Portion where no crop was grown between rows in 1938	
		No. of trees	Percent	No. of trees	Percent
I	No leaves on trees	52	2.89	1	0.05
II	Leaves only at tips of branches	592	32.96	39	2.17
III	Leaves on upper 4-5 nodes and scattered through tree	436	24.27	187	10.41
IV	Leaves on branches but lower portion of tree completely defoliated	45	2.50	311	17.31
V	Defoliation present but not pronounced	0	0	121	6.73
VI	Normal tree - just trace of defoliation	0	0	12	0.66

Rust (Tranzschelia pruni-spinosae discolor): Only an occasional pustule was found on the leaves in the fall of 1939 in the peach orchard where the fungus was very prevalent in 1938. The few pustules found in 1939 consisted of urediospores only, whereas in 1938 teliospores also were produced in considerable abundance.

Peach Leaf Curl (Taphrina deformans): The first specimens of this disease were observed on April 21. Additional specimens were seen later but no serious outbreak of the disease was encountered.

Peach Rosette: Three abandoned peach trees near Rogers were found to be affected with rosette. The trees were originally located by a member of the Phony Peach Disease Survey crew in the course of their inspection of orchards in northwest Arkansas. The same group also located 3 other similarly affected trees near Omaha, Arkansas. The affected trees were later destroyed by an employee of the State Plant Board.

Spray Injury to Peaches: Fruit specimens received from Jonesboro July 16 showed unmistakable symptoms of arsenical injury. Later in the season twig specimens which also showed arsenical injury symptoms were received from an orchard near Fort Smith. The abundance of moisture during May and June apparently favored the development of this type of injury in 1939.

Cherry Diseases

Leaf Spot (Coccomyces hiemalis): The frequent rains during the month of May favored the development of this disease and excessive defoliation was noted in some orchards. Most of the trees had a light crop owing to the spring frosts and the defoliation did not seriously affect the quality of the fruit.

A seriously affected Early Richmond orchard was examined near Graphic on November 11. The leaf spot fungus was found sporulating profusely on the new leaves which developed late in the fall.

Quince Diseases

Leaf Spot (Fabraea maculata): Typical specimens of quince leaf blight were received from a grower during the last week of June. The injured leaves were from non-sprayed trees and it was stated that the trees were practically defoliated by the attack of the fungus.

(Cooperative investigations between the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture, and the Arkansas Agricultural Experiment Station).

SOME NOTES ON BLACK ROT OF KALE IN VIRGINIA

T. J. Nugent

Several thousand pounds of kale seed are treated at the Virginia Truck Experiment Station each year for the farmers and seed companies in the Tidewater area. The treatment consists of soaking the seed for 20 minutes in a 1-1000 solution of bichloride of mercury followed by washing thoroughly in running water and drying. Tests made by making dilution plates of water in which treated seed had been washed, failed to yield any bacterial colonies resembling the black rot organism (Bacterium campestre) [Phytomonas campestris]. This indicated that the treatments were effective.

Black rot was present, however, in a considerable number of kale fields even though treated seed was used. The amount of infection varied considerably between individual fields, and this was true even when seed

had been purchased from the same seed company whose seed had all been treated at the same time and place. This has led to the conclusion that when black rot develops in kale fields planted with treated seed, the inoculum does not come from the seed but from some other source such as the soil, seed drills, or other implements.

These notes are given as further evidence to support the observations and conclusions of Dr. H. S. Cunningham on the effectiveness of the hot water treatment in eliminating the black-rot organism from cauliflower seed, reported in the Plant Disease Reporter (Vol. 23, No. 23, pp. 380-381).

(Virginia Truck Experiment Station, Norfolk).

A PRELIMINARY STUDY OF ANTHRACNOSE SPORE LOAD ON COTTON SEED

Paul R. Miller

Introduction

Comprehensive surveys of cotton seedling and boll diseases have been conducted by the Division of Mycology and Disease Survey in cooperation with the Division of Cotton and Other Fiber Crops and Diseases and several southern Experiment Stations during 1938 and 1939 (3, 4, 5 & 6). The results of these surveys have demonstrated that Glomerella gossypii is the most widespread and predominant organism causing damping-off of cotton seedlings in the cotton belt east of Texas and Oklahoma. It is to be noted that while the "typical anthracnose boll rots" described by Barre and by Edgerton are no longer of common occurrence the fungus is to be found rather frequently on diseased bolls in this area. In general, however, a relatively small number of diseased bolls have been noted in the field, and it seems improbable that the widespread distribution of Glomerella gossypii on seedlings corresponds to the number of seed derived from diseased bolls.

A theory has been advanced that the mixing of seed during the ginning process may be responsible for dissemination of spores from lesions on diseased bracts and other debris from seed to seed within lots, and possibly from infested to disease-free lots. Investigations on the role of the ginning process in distributing anthracnose spores are being conducted by Dr. Richard Weindling. The purpose of the work herein reported was to obtain some information on the occurrence and prevalence of seed-borne organisms on growers' cotton seed, with special reference to anthracnose spores.

This preliminary study has been made possible by the generous cooperation of several cotton investigators who are located in the field and who secured the seed samples. To date seed from Georgia only have been studied. Dr. U. R. Gore, of Experiment Station, Georgia, not only supplied the samples herein reported upon, but also furnished the data on germination recorded in Table II.

Methods 1/

Samples of 500 seeds each were shaken (washed) with a standard international shaking machine at 600 R.P.M. for 10 minutes in 200 c.c. of water. 100 c.c. of the resulting spore suspension were transferred to two 50 c.c. centrifuge tubes and centrifuged at 3300 R.P.M. for 10 minutes, decanted to 5 c.c. each, and the contents of these two bottles poured into one 15 c.c. centrifuge tube. This was again centrifuged at 3300 R.P.M. for 10 minutes and decanted to 1 c.c. In other words, all of the sedimental material, including the spores, in the original 100 c.c. of liquid was concentrated into 1 c.c. by pipetting off the supernatant liquid. After thoroughly shaking this 1 c.c. of spore suspension, the chamber of a Levy cell (Haemocytometer) was filled with an aliquot part and the number of spores per seed calculated. The number of spores was counted on 1 sq. mm for light spore loads and on 1/25 sq. mm when spores were abundant. 1 sq. mm is equivalent to a volume of 0.1 mm^3 since the cell is 1/10 mm deep. Therefore, 1 c.c. contained 10,000 of such units. 10,000 was multiplied by 2, since only half of the original spore suspension is centrifuged, and this product was divided by 500, the number of seeds per sample. Therefore, the formula is as follows:

$$\frac{10{,}000 \times 2 \times X}{500} = 40X \text{ spores per seed, where}$$

X = number of spores counted per sq. mm, or

25X = number of spores counted per 1/25 sq. mm

After the spore counts were made, the excess water was drained from the bottles and the seed were allowed to germinate. Notes were taken on the tenth day as to the lesions observed on the seedlings.

Utilizing the technique described above, the following tests were undertaken to ascertain the percentage of the total removable number of Glomerella spores on cotton seed which could be obtained in one 10-minute washing. Twenty portions, each of 500 seed, were taken from a sample of cotton; each portion was washed for 10 minutes, the spore suspensions

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1/ Some of the technique employed was adopted from procedure described in "Studies on the Heating of High Moisture Wheat in Storage, With Special Reference to the Action of Microorganisms," by Edward P. Carter, on file at the library of the University of Maryland.

Table 1. The percentage of recovered spores removed in the first wash.

Determination	Spores per seed obtained in first wash	Spores per seed in subsequent washes	Total spores per seed	Percent of spores removed in first wash
1	1560	470	2030	78
2	1280	200	1480	86
3	1640	520	2160	76
4	600	1280	1880	32
5	1320	360	1580	83
6	1680	520	2200	76
7	1200	280	1480	81
8	2360	240	2600	91
9	1080	720	1800	60
10	1200	120	1320	91
11	1960	520	2480	79
12	1600	360	1960	82
13	960	240	1200	80
14	720	200	920	78
15	1080	160	1240	87
16	1360	400	1760	77
17	840	720	1560	54
18	1440	160	1600	90
19	1520	80	1600	95
20	1160	200	1360	85
Average				78 ± 3.34

centrifuged, and the number of spores per seed calculated. Each portion was then washed in successive changes of water and similar spore counts made on each suspension until the number of spores in a washing was negligible. The results of these determinations are presented in Table 1. They show that about 80 percent of the total number of spores recovered from this sample of cotton seed were removed in the first 10-minute wash. It is realized, however, that the percentage of spores released in the first wash may be somewhat dependent upon the actual spore load of the sample. It should be noted, also, that in subsequent tests the addition of wetting agents to the wash water resulted in the release of more spores than when water alone was used.

To gain some idea of the dependability of the method, determinations of spore load were made on 50 portions of a cotton seed sample. From the results, calculations of standard error were computed, as follows:

$$\bar{x} = 1,375$$

$$d_2 = 554,244$$

$$s_{\bar{x}} = \sqrt{\frac{554,244}{50\ (49)}}$$

$$s_{\bar{x}} = 14.35$$

$$CV = \frac{14.35}{13.75} = 1.2\%$$

Results

Results of the study of Georgia cotton seed are presented in Table 2 and graphically in Figures 1 and 2. Inspection of the tabular results shows that there is some tendency toward an inverse relationship between the percentage germination of a seed sample and the determined amount of anthracnose spore load--the better the germination the lower spore load, and vice versa. However, there are to be noted several exceptions to this generalization. The number and severity of the lesions on seedlings resulting from the germination of a given sample also seemed to bear a direct relationship to the spore load of the sample. It is doubtful, however, if the observations on germination are of much significance since the seed were germinated under very abnormal conditions.

In certain samples where no spores were found on the seed, the resultant seedlings developed "typical" anthracnose lesions. Microscopic examination of the scrapings showed that numerous Glomerella spores were present. This inconsistency is attributed to the shortcomings of the technique and insufficient knowledge of the disease. Perhaps it would not be reasonable to expect that all the spores would be dislodged in the time that it is practicable to devote to washing a sample, and it is not known how many spores per seed are necessary to cause seedling infection under varying environmental conditions.

In no case was the spore load found to be as high as were reported by Barre and Aull (1) and by Edgerton (2) (5,000 to 10,000 spores per seed), who about 25 years ago were the first to use the washing-centrifuging method for detection of Glomerella gossypii. The reason, apparently, for this difference is that under conditions prevailing at present, anthracnose boll rot is much less severe than formerly. It now seems entirely probable that much cotton goes to the gin free from anthracnose spores and that the seed become contaminated during the ginning process.

Table 2. The percentage germination of cotton seed in relation to the estimated number of anthracnose spores present on seed collected in Georgia in 1939.

County	Sample number	Percent germination	Anthracnose spore load	Lesion types
Morgan	201	87.0	low 1/	S.L. 2/
Newton	202	-	none	S.L.
Oconee	203	81.5	none	S.L.
Oconee	204	92.0	none	S.L.
Walton	205	86.0	none	S.L.
Morgan	206	79.0	low	Se.L.
Henry	207	-	medium	Se.L.
Walton	208	90.0	none	S.L.
Rockdale	209	88.0	none	N.L.
Spalding	210	75.5	none	S.L.
Rockdale	211	-	medium	Se.L.
Screven	212	40.5	high	S.D.
Jenkins	213	65.0	high	Se.L.
Burke	214	80.5	none	S.L.
Bulloch	215	34.0	high	Se.L.
Candler	216	45.5	high	Se.L.
Screven	217	60.0	medium	Se.L.
Pulaski	218	45.0	medium	Se.L.
Dodge	219	49.5	high	S.D.
Wayne	220	-	none	S.L.
Crisp	221	73.5	medium	S.L.
Evans	222	82.0	none	S.L.
Toombs	223	64.5	none	S.L.
Wheeler	224	50.0	medium	S.L.
Emanuel	225	45.0	low	Se.L.
Crisp	226	63.5	medium	Se.L.
Wilkinson	227	53.5	medium	Se.L.
Brooks	228	66.5	medium	S.L.
Washington	229	37.0	medium	S.L.
Coffee	230	71.0	low	Se.L.
Lowndes	231	73.0	high	Se.L.
Laurens	232	46.0	high	S.L.
Tattnall	233	68.5	medium	S.L.
Spalding	234	88.0	none	S.L.
Peach	235	66.0	high	S.L.
Toombs	236	75.5	high	Se.L.
-	237	61.5	medium	S.L.

1/ None = no spores found; low, 40 to 500; medium, 500 to 2000; high, over 2000.

2/ S.L. = superficial lesions; Se.L., severe lesions; N.L., no lesions; S.D., seedlings dead.

Table 2. (Continued).

County	Sample number	Percent germination	Anthracnose spore load	Lesion types
Fulton	238	-	none	S.L.
Burke	239	-	low	S.L.
Peach	240	88.0	none	S.L.
Peach	241	70.0	none	S.L.
Peach	242	85.0	none	Se.L.
Peach	243	16.0	high	S.D.
Monroe	244	45.0	high	S.D.
Upson	245	69.0	medium	S.L.
Monroe	246	78.0	medium	S.L.
Oglethorpe	247	70.5	low	S.L.
Seminole	248	-	low	Se.L.
Worth	249	52.0	high	Se.L.
Stewart	250	73.0	low	Se.L.
Carroll	251	94.0	none	S.L.
Harris	252	85.0	none	S.L.
Marion	253	66.0	low	Se.L.
Terrell	254	74.0	none	S.L.
Douglas	255	83.0	low	S.L.
Schley	256	56.0	low	S.D.
Randolph	257	50.0	medium	Se.L.
Early	258	44.0	high	Se.L.
Gwinnett	259	84.0	medium	S.D.
Stevens	260	84.0	none	S.L.
Elbert	261	83.0	medium	N.L.
Bartow	262	90.0	none	S.L.
Jackson	263	91.0	none	S.L.
Jackson	264	74.0	high	Se.L.
Hart	265	90.0	none	N.L.
Banks	266	94.0	low	S.L.
Gordon	267	84.6	low	S.L.
Polk	268	87.0	medium	S.L.
Chattooga	269	90.0	none	S.L.
Walker	270	82.0	none	S.L.
-	271	84.0	low	S.L.
Walker	272	83.5	medium	S.L.
-	273	82.5	low	S.L.
Floyd	274	78.0	medium	S.D.
Burke	275	33.5	none	S.L.
Burke	276	68.0	high	Se.L.
-	277	-	medium	Se.L.
-	278	-	none	S.L.

Figure 1:
PERCENTAGE GERMINATION OF GEORGIA COTTON SEED
FROM COUNTIES INDICATED

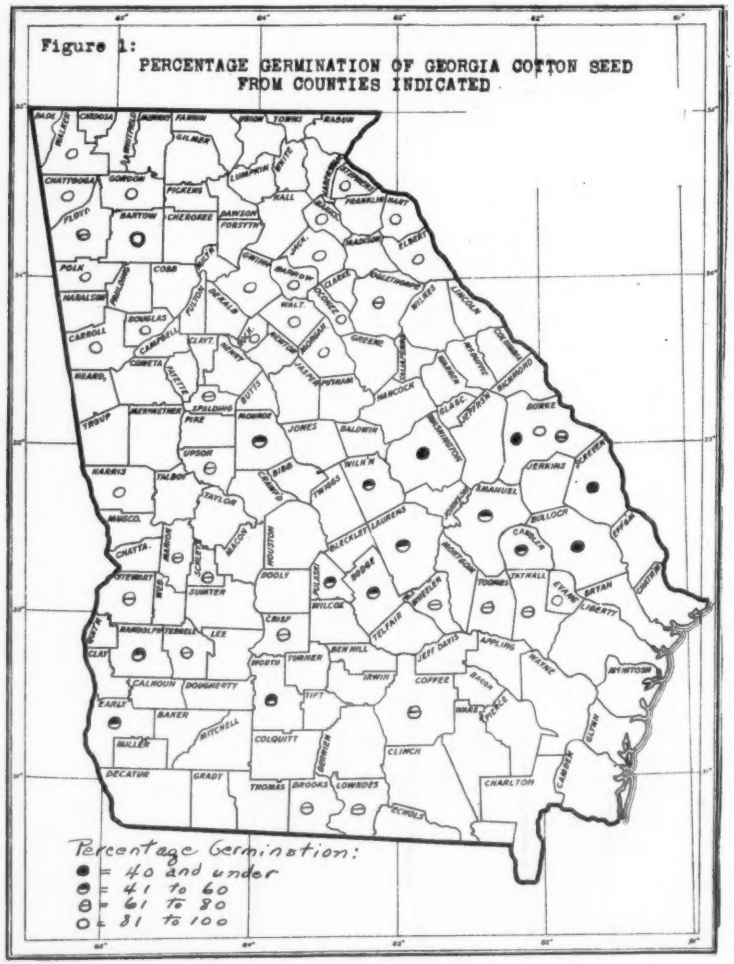
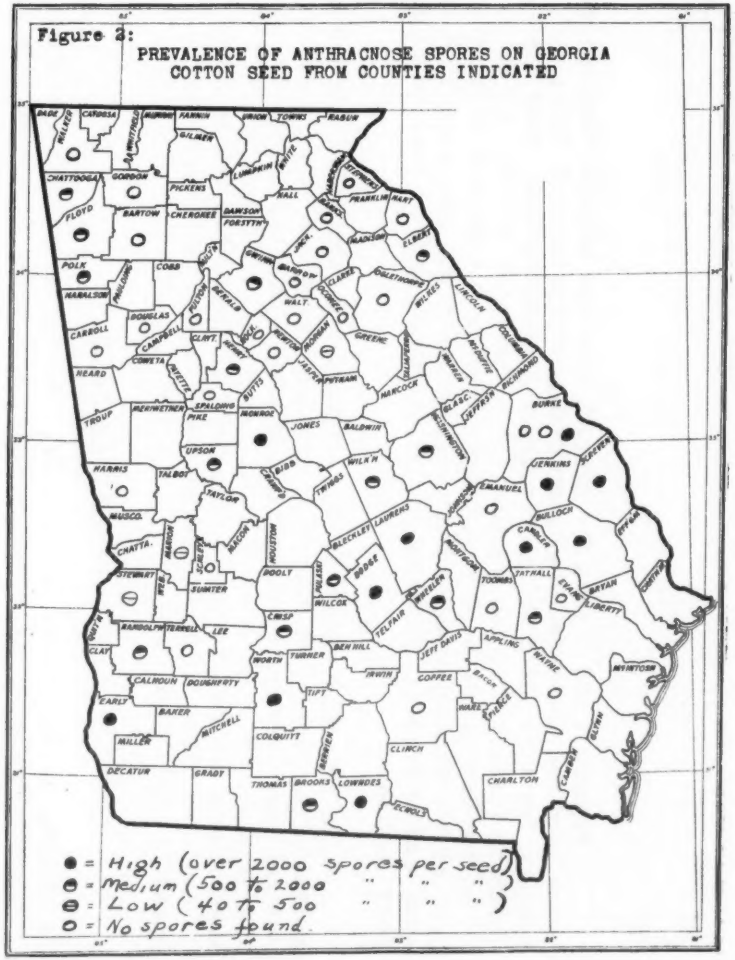


Figure 2:
PREVALENCE OF ANTHRACNOSE SPORES ON GEORGIA
COTTON SEED FROM COUNTIES INDICATED



Figures 1 and 2 show the general relation between high anthracnose spore load and low percentage germination of cotton seed lots, and between low spore load and high percentage germination. They also show a definite tendency for the germination to be lower and for the spore load to be heavier in the seed lots originating on the Coastal Plain (southern part of the State), and for better germination and low spore load on the seed coming from the Piedmont Region (northern part of the State) for the past season.

The practical value of the washing-centrifuging-Haemocytometer method of measuring anthracnose spore load on cotton seed is yet to be determined. Improved technique and much more definite knowledge of the significance of varying spore loads are necessary before the method can confidently be recommended to determine the necessity for seed treatment in order to obtain good stands with seed from a particular region or from specific seed lots.

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(Division of Mycology and Disease Survey, in cooperation with the Division of Cotton and Other Fiber Crops and Diseases).

A CONTRIBUTION TO THE FUNGUS FLORA OF NEVADA

John A. Stevenson and W. Andrew Archer

During the summer seasons of 1937 and 1938 the second author with a number of associates was engaged on a Bankhead-Jones project in the State of Nevada studying plants used by American Indians. During both periods rainfall was above normal and fungi as a consequence were much in evidence. Incidental to other duties a considerable series of parasitic fungi was collected, for the most part of the Uredinales. Since many of these fungi are new to the State or supply new host records, it has seemed worth while to prepare the list which follows.

Host identifications have been made by taxonomists of the Division of Plant Exploration and Introduction of the Bureau of Plant Industry. All willows were named by C. R. Ball, Tennessee Valley Authority. Several of the rust determinations have been made by Dr. G. B. Cummins, of Purdue University, and a number of others checked for accuracy. All records are for the State of Nevada unless otherwise indicated.

The records in Arthur's "Manual of the rusts in United States and Canada" have been the basis of deciding whether or not the Uredinales listed herein are new to the Nevada flora and whether new host species are concerned.

PHYCOMYCETES

Albugo candida (Pers.) Kuntze:

On Lepidium fremontii S. Wats., south of Hawthorne, Mineral Co. A new host for this common species of Albugo, which is itself new to the State Flora.

On Sisymbrium altissimum L., along Cortez-Rean Road, 15-30 miles north of Cortez, Lander Co.

Albugo tragopogonis (DC.) S.F. Gray:

On Senecio integerrimus Nutt., Hunter's Lake, Sierra Nevada Range, Washoe Co. A new host for this "white rust," which is itself a new fungus for the State flora.

Peronospora oxybaphi Ell. & Kellerman:

On Hemidium alipes S. Wats., 7 miles north of Wadsworth, Washoe Co. The first report of this downy mildew on this host genus, and in fact apparently the first report of any fungus on the genus. An unnamed Dematiaceous form associated with striking leaf spots is also present and will be described elsewhere.

Peronospora parasitica (Pers.) Fr.:

On Descurainea californica (Gray) O. E. Schulz, Galena Creek, near Mt. Rose, Washoe Co.; and Descurainea sp., Thomas Falls, Thomas Creek Canyon, Eureka Co. In America collections on the Crucifers are usually referred as above, although Gäumann (Beiträge zu einer Monographie der Gattung Peronospora) would restrict P. parasitica to Capsella bursa-pastoris. After the Gäumann system the form on Descurainea approaches P. sophiae pinnata Gäum. Under either designation the fungus is new to the flora of Nevada on this host genus.

Peronospora tabacina Adam:

On Nicotiana attenuata Torr., west of Reno Hot Springs, Washoe Co.; 10 miles north of Wadsworth, Washoe Co. Dr. E. E. Clayton notes that the fungus on this host differs somewhat from the typical form on N. tabacum in that the conidiophores are less extensively branched. This is a new host for this tobacco downy mildew. It has been previously listed for the State under the name Peronospora sordida Berk. by Harkness (Bul. Calif. Acad. Sci. 1: 262, 1886) on Nicotiana bigelovii, who reported it as "very common at Reno."

ASCOMYCETES

Claviceps purpurea (Fr.) Tul.:

On Elymus triticoides Buckl., 7 miles north of Dieringer on road to Cloverdale, Nye Co.

Erysiphe cichoracearum DC.:

On Nemophila spathulata Cov., Hunter's Creek Road, Sierra Nevada Range, Washoe Co. A new host for this ubiquitous powdery mildew.

Rhytisma salicinum (Pers.) Fr.:

On Salix hindsiana Benth., Steptoe Creek, Shell Creek Range, White Pine Co. A new host species for this common tarspot fungus which does not appear to have been previously reported from the State.

Sphaerotheca humuli (DC.) Burr.:
(Sphaerotheca fusca [Fr.] em. Blumer).

On Agoseris arizonica Greene, Peavine Mt., Washoe Co.; on Agoseris retrorsa (Benth.) Greene, Jones Creek, Washoe Co. A. arizonica is a new host species for this common and widespread powdery mildew which is apparently new to the State flora.

UREDINALES

Aecidium graebnerianum P. Henn. I.:

On Habenaria leucostachys Wats., head of Copper Creek, Jarbidge Mts., Elko Co. The rust is new to the State flora.

Cronartium coleosporioides (Diet. & Holw.) Arth. II, III:

On Castilleja miniata Hook., 6 miles north of Incline, Mt. Rose road, Washoe Co.; on Castilleja pinetorum Fernald, along creek at Incline, Washoe Co.; along Galena Creek above camp ground, Tahoe Nat. Forest, Washoe Co. C. pinetorum is a new host species. The rust is new to the State on C. miniata.

Cronartium occidentale Hedgc., Bethel & Hunt. III:

On Ribes velutina Greene, Cory Canyon, east slopes Wassuk Range, Mineral Co.

Cumminsiella sanguinea (Pk.) Arth. II, III:

On Berberis repens Lindl. (Mahonia repens [Lindl.] Don.), 60 miles south of Elko, Elko Co.; Kyle Canyon, Spring Mts., Clark Co.; 7 miles west of Lehman Caves, White Pine Co. New to the State.

Melampsora lini (Pers.) Lév. II, III:

On Linum lewisii Pursh, Lehman Cave National Monument headquarters, Snake Range, White Pine Co.

Melampsora ribesii-purpureae Kleb. II:

On Salix sp., Deeth, Elko Co.; on Salix lasiandra var. lancifolia Bebb, Galena Creek, Mt. Rose, Washoe Co. The rust is new for Nevada and the latter collection the first on that host.

Peridermium ornamentale Arth. 0, I:

On Abies concolor Lindl. & Gord., headwaters of Dave Creek, 18 miles N.E. of Jarbidge, Elko Co. Cummins notes, "Listed under Pucciniastrum goeppertianum (Kühn) Kleb. in Arthur's Manual, but probably does not belong there." New to the State under either name.

Phragmidium ivesiae Syd. III:

On Potentilla flabelliformis Lehm., 2 miles west of Owyhee, Elko Co.; on Potentilla gracilis subsp. nuttallii (Lehm.) Keck, north end of Lake Tahoe, 2 miles east of Brockway, Washoe Co.; on Potentilla pectinisecta Rydb., 14 miles southeast of Wellington, Lyon Co. The last 2 hosts are new for the United States, the first is new for the State.

Phragmidium montivagum Arth. II, III:

On Rosa woodsii Lindb., Jarbidge River Canyon, Elko Co.; Cory Creek, Wassuk Range, Mineral Co.; Thomas Creek, Washoe Co. New to the State on this host.

Phragmidium rubi-idaei (DC.) Karst. I, III:

On Rubus melanolasius Focke, headwaters of Jarbidge River, above Jarbidge, Elko Co. First report for the State. Determination by G. B. Cummins.

Puccinia absinthii (Hedw.f.) DC.:

On Artemisia cana Pursh, South Fork of the White River, White Pine Co. New to the State on this host. II, III.

On Artemisia tridentata Nutt., along Galena Creek near Mt. Rose, Tahoe Nat. Forest, Washoe Co. II.

Puccinia aemulans Syd. II, III:

On Enceliopsis (Helianthella) nudicaulis (Gray) A. Nels., Lida Road, near Hornsilver, Esmeralda Co. A new host, and new to the State flora.

Puccinia aristidae Tracy:

On Abronia sp., north of Yerington, Lyon Co., Soil Conservation Service (Koch, Holstein and Carlson). A new host genus for the State. O, I.

On Anisocoma acaulis T. & G., north end of Walker Lake, Mineral Co., Soil Conservation Service (Carlson & Holstein). A new host for this rust of many hosts. I.

On Distichlis stricta (Torr.) Rydb., Cory Creek, Mineral Co. Previous reports of this rust on D. spicata for Nevada presumably should be changed to D. stricta. II, III.

On Heliotropium oculatum Heller, near Warren Morden Ranch, 4 miles north of Fallon, Churchill Co. A new host for this species of many hosts. I.

On Stanleya pinnata (Pursh) Britton, north of Walker Lake, Mineral Co., Soil Conservation Service (Carlson & Holstein). New to the State on this host. O, I.

Puccinia atrofusca (Dudl. & Thomp.) Holw. O, I:

On Artemisia sp., Owyhee, Elko Co. The first record of the aecia for Nevada.

Puccinia bistortae (Str.) DC. II:

On Polygonum bistortoides Pursh (Bistorta bistortoides [Pursh] Small), vicinity of Marlette Lake, 3 miles west of Lake Tahoe, Ormsby Co. New to the State.

Puccinia burnettii Griff. III:

On Oryzopsis hymenoides (R. & S.) Ricker, Cory Creek, Mineral Co.

Puccinia caricis (Schum.) Schroet. II:

On Carex sp., University of Nevada Campus, Reno, Washoe Co. Determination by G. B. Cummins.

Puccinia caricis urticata (Kern) Arth. II:

On Carex nebraskensis Dewey, 4 miles north of Reno, Washoe Co. A new host for the State. Determination by G. B. Cummins.

Puccinia cicutae Lasch III:

On Cicuta occidentalis Greene, near Reno, Washoe Co. New to the State.

Puccinia cirsii Lasch II, III:

On Cirsium breweri Gray, west of Carson City, on the Osterman Grade, Ormsby Co.

On Cirsium undulatum (Nutt.) Spreng., Stan Valley, 6 miles east of Deeth, Elko Co. New hosts for the State flora.

Puccinia crandallii Pam. & Hume II, III:

On Festuca rubra L., headwaters Thomas Creek, Washoe Co. New to the State on this host.

Puccinia ellisii de T.:

On Angelica breweri Gray, Fort McDermitt Indian Reservation, Humboldt Co. A new host for the State. II, III.

On Angelica scabrida Clokey & Mathias, Charleston Park, Kyle Canyon, Charleston Mts., Clark Co. A new host for the rust which is itself new to the State flora. III.

Puccinia grindeliae Pk. III:

On Chrysothamnus viscidiflorus (Hook.) Nutt., Pole Canyon, 5 miles north of Secret, Elko Co. New to the State on this host.

On Psilostrophe cooperi (Gray) Greene, Ireteba Peaks, 20 miles N.E. of Searchlight. New to the State on this host.

On Tetradymia canescens inermis (Nutt.) Gray, Hunter's Creek Road, Sierra Nevada Range, Washoe Co.

On Tetradymia glabrata Gray, Pyramid Lake.

Puccinia harknessii Vize III:

On Lygodesmia spinosa Nutt., Red Rock Canyon Road, 25 miles north of Reno, Washoe Co.

On Ptiloria pauciflora (Torr.) Raf., Morgan Creek, North of Nixon, Washoe Co. New to the State on this host.

On Ptiloria tomentosa (Torr.) Raf., Camp ground along Galena Creek, Tahoe Nat. Forest, Washoe Co.

Puccinia hieracii (Schum.) Mart.:

On Agoseris glauca (Pursh) D. Dietr., Log Cabin Creek, Jarbidge Mts., Elko Co. A new host for the State. II, III.

On Crepis acuminata Nutt., along Truckee River at Iceland, Sierra Co., California, and Mountain View, 6 miles S.E. of Deeth, Elko Co., Nevada. A common species to both States. III.

On Crepis occidentalis Nutt., near Verdi, Washoe Co. III.

Puccinia holboellii (Hornem.) Rostr. O:

On Arabis rupestris Nutt., Pyramid Lake. A new host for this rust.

Puccinia intermixta Pk. O, I, III:

On Iva axillaris Pursh, Austin Gulch, Slumbering Hills, Humboldt Co.; Reno, Washoe Co.

Puccinia jonesii Pk. III:

On Leptotaenia multifida Nutt., Mt. Rose Camp Grounds at Galena Creek, Tahoe Nat. Forest, Washoe Co. New to the State on this host.

Puccinia menthae Pers. 0, I, II, III:

On Madronella (Monardella) odoratissima Benth., 8 miles east of Lake Tahoe, Sierra Nevada Range, Washoe Co. New to the State flora.

Puccinia monoica (Pk.) Arth. 0, I:

On Arabis sparsiflora Nutt., Truckee River at Iceland, 25 miles west of Reno, Sierra Co., California; Mt. Rose Camp grounds at Galena Creek, Tahoe Nat. Forest, Washoe Co., Nevada. A new host for this widely distributed rust.

Puccinia oenotherae Vize. II, III:

On Boisduvalia densiflora (Lindl.) Wats., Reno-Carson Highway, 22 miles south of Reno, Washoe Co.; Chicken Creek, west of Mountain City, Elko Co. New to the State on this host. Determination by G. B. Cummins.

On Oenothera heterantha Nutt., Hunter's Lake, Sierra Nevada Range, Washoe Co. A new host.

Puccinia plumbaria Pk. III:

On Phlox longifolia Nutt., hillside near Owyhee, Elko Co.

Puccinia poae-sudeticae (Westend.) Jørstad. II:

On Poa pratensis L., Headwaters Thomas Creek, Washoe Co.; on Trisetum spicatum (L.) Richt., 8 miles east of Lake Tahoe, Sierra Nevada Range, Washoe Co. New for Nevada. Determination by G. B. Cummins.

Puccinia rufescens Diet. & Holw. III:

On Pedicularis centranthera A. Gray, 3/4 mile west of Ely, White Pine Co. A new rust for the State.

Puccinia subcircinata Ell. & Ev. III:

On Senecio integerrimus Nutt., Hunter's Lake, Sierra Nevada Range, Washoe Co.; Tahoe Meadows, Washoe Co. New to the State.

Puccinia suksdorfii Ell. & Ev. III:

On Agoseris arizonica Greene, Peavine Mt., Washoe Co. First report of the rust for Nevada.

Puccinia vagans gayophyti (Billings) Arth. II, III:

On Gayophytum lasiospermum Greene, Mt. Rose Camp Grounds, Galena Creek, Tahoe Nat. Forest, Washoe Co. New to the State on this host.

Puccinia violae (Schum.) DC. II, III:

On Viola nephrophylla Greene, Robinson Creek, Ruby Valley, Elko Co. New on this host for the State.

Pucciniastrum galii (Lk.) Fisch. II:

On Galium triflorum Michx., along creek at Incline, Washoe Co. New to the State flora.

Pucciniastrum goeppertianum (Kühn) Kleb. See under Peridermium ornamentale Arth.

Pucciniastrum pyrolae (Pers.) Schroet. II:

On Pyrola chlorantha Sw., Log Cabin Creek, Jarbidge Mts., Elko Co.; on Pyrola pallida Greene, 4 miles west of Zephyr Cave, Sierra Nevada Range, Douglas Co. The latter host is new for the rust, which is itself new for the State.

Uredo nicotianae A.S.S. II:

On Nicotiana attenuata Torr., Cory Creek, Mineral Co. For the United States known previously only from southern California on N. bigelovii Wats.

Uromyces acmulus Arth. III:

On Allium validum S. Wats., about 5 miles west of Woodfords, Alpine Co., California. Does not appear to have been reported previously on this host for California.

Uromyces fabae (Pers.) DeBy. I, III:

On Vicia americana Muhl., Reno, Washoe Co. The aecia parasitized by Tuberculina persicaria (Ditm.) Sacc. Both fungi new for the State flora.

Uromyces glycyrrhizae (Rab.) Magn. III:

On Glycyrrhiza lepidota Nutt., near Dunphy, Eureka Co.

Uromyces intricatus Cke.:

On Eriogonum heermannii, Dur. & Hilg., north of Yerington, Lyon Co., Soil Conservation Service (Holstein, Koch & Carlson). A new host species for this common Eriogonum rust. O, I, III.

On Eriogonum microthecum Nutt., Birch Creek Canyon, Lander Co. New to State on this host. II, III.

On Eriogonum nudum Dougl., Galena Creek, Tahoe Nat. Forest; Mt. Rose Camp Ground, Tahoe Nat. Forest, Washoe Co. Uredia epiphyllous and caulicolous. New to the State on this host. II.

On Eriogonum umbellatum subsp. aridum (Greene) Stokes, Water Canyon, Sonoma Range, Humboldt Co. New on this host for the State. II.

On Eriogonum wrigatii Torr., west of Carson City, on the Osterman Grade, Ormsby Co.; Galena Creek, near Mt. Rose, Tahoe National Forest, Washoe Co. Telia caulicolous and abundant. New to the State on this host. I, II, III.

Uromyces junci (Desmaz.) L. Tul. II, III:

On Juncus balticus Willd., Camp Ground along Galena Creek, Mt. Rose, Tahoe Nat. Forest, Washoe Co.; 4 miles north of Reno, Washoe Co.; 2 miles west of Kellogg, Esmeralda Co.

Uromyces minor Schroet. I:

On Trifolium sp., Mt. Meadow, Washoe Co. This rust has been reported from the State on at least 2 host species.

Uromyces nerviphilus (Grognat) Hotson III:

On Trifolium repens L., Timber Creek, west slope of Shell Creek Range, White Pine Co. New to the State.

Uromyces proëminens typica Arth. II, III:

On Euphorbia serpyllifolia Pers. (Chamaesyce serpyllifolia [Pers.] Small), Camp Ground along Galena Creek, near Mt. Rose, Tahoe Nat. Forest, Washoe Co.

Uromyces punctatus Schroet. II:

On Astragalus fremontii Gray, Cory Creek, Mineral Co.; north of Wadsworth, Washoe Co.; Desert Valley, west of Silver Canyon Mts., Lincoln Co.; on Astragalus lentiginosus Dougl., Edwards Creek Ranch, 9 miles from Alpine, Churchill Co.; on Astragalus shockleyi Jones, Indian Creek, White Mts., Esmeralda Co. The first and last host species cited constitute new hosts for the rust.

Uromyces zygadeni Pk. I, III:

On Zigadenus paniculatus (Nutt.) S. Wats., 15 miles north of Ruby Valley Post Office, Elko Co.

USTILAGINALES

Tilletia asperifolia Ell. & Ev.:

On Muhlenbergia asperifolia (Nees & Mey.) Parodi, foot of old Geiger Grade, 15 miles southeast of Reno, Washoe Co.

Ustilago bromivora (Tul.) Fischer de W.:

On Bromus marginatus Nees, Log Cabin Creek, Jarbidge Mts., Elko Co.

Ustilago gayophyti Hark.:

On Gayophytum nuttallii T. & G. (G. racemosum T. & G.), Cory Canyon, west of Hawthorne, Mineral Co. The first report of the smut for the State and a new host for North America.

Ustilago hypodytes (Schlecht.) Fr.:

On Oryzopis hymenoides (R. & S.) Ricker (O. cuspidata Benth.), Wilson Canyon, between Smith and Mason Valleys, Lyon Co.; 13-15 miles southeast of Manhattan on road to Tonopah, Nye Co.; Cory Creek, Mineral Co.

On Stipa elmeri Piper & Brodie, along creek at Incline, Washoe Co. New to the State on this host.

FUNGI IMPERFECTI

Cylindrosporium consociatum Dearn.:

On Acer glabrum Torr., Baker Creek, Snake Range, White Pine Co.; along Fox Creek, 3 miles above Jarbidge, Elko Co. This leaf-spot producing fungus is apparently new to the State flora. Determination by Alice J. Watson.

Cytospora sp.:

On Salix scouleriana Barratt, Camp Grounds at Galena Creek near Mt. Rose, Tahoe Nat. Forest, Washoe Co., causing a marked cankering of twigs and branches.

Epochnium isthmophorum Sacc.:

On Chrysothamnus nauseosus occidentalis (Greene) Hall, Camp Ground along Galena Creek, Tahoe Nat. Forest, Washoe Co. This is a new host for this fungus known previously only from the type collection from Washington.

Gloeosporium ribis (Lib.) Mont. & Desm.:

On Ribes inerme Rydb., headwaters of Cory Creek, Wassuk Range, Mineral Co. No previous record of this species found for the State.

Phyllosticta minutissima Ell. & Ev.:

On Acer glabrum Torr., along Fox Creek, 3 miles above Jarbidge, Elko Co. Associated with Cylindrosporium consociatum.

Phyllosticta vagans Pk.:

On Smilacina liliacea (Greene) Wynd., Cory Creek, Mineral Co. A new host species for this common leaf-spot fungus. Determination by Alice J. Watson.

Polythrincium trifolii Selm. & Kze.:

On Trifolium repens L., Timber Creek, west slope of Shell Creek Range, White Pine Co. The conidial and spermagonial stages of Cymadothea trifolii Wolf. Determination by Alice J. Watson.

Septoria septulata Beach:

On Convolvulus arvensis L., in canyon above Ravenswood, Lander Co. This Septoria has been referred heretofore to S. convolvuli Desm., but Beach (Amer. Jour. Bot. 6: 19, 1919) points out differences in the forms commonly occurring on Convolvulus sepium and C. arvensis and names that on the latter species as above.

Tuberculina persicariae (Ditm.) Sacc.:

See under Uromyces fabae.

(Divisions of Mycology and Disease Survey and Plant Exploration and Introduction).

THE ABNORMALLY COLD JANUARY

With practically all reports in from the far flung, vast network of stations maintained by the Weather Bureau, an interesting summary is now possible for the outstandingly cold weather of January of this year. On a basis of State average temperatures, the following States had the coldest January of record: South Carolina, Georgia, Alabama, Mississippi, Louisiana, Texas, Tennessee, Missouri, and Kansas. In addition, the average temperature for the following States approximately equalled the previous low record: Maryland and Delaware, Virginia, West Virginia, Florida, Kentucky, and Oklahoma. In the States in which previous records for cold weather were broken the temperature averaged from 2° to 4° lower than for any previous January since State-wide records have been tabulated by the Weather Bureau.

The outstanding feature of the January cold was its persistence through the month, rather than the occurrence of extremely low temperatures on any particular day, although the latter exceeded previous records in some States and approached them in many others. Blairsville, Georgia, reported a minimum temperature of 16° below zero and Long Creek, South Carolina, 13° below, both exceeding the previous low State record of 12° and 11° below, respectively. The lowest reported for January of this year in the Southern States were as follows: Virginia, -20°; North Carolina, -18°; South Carolina, -13°; Georgia, -16°; Alabama, -16°; Mississippi, -14°; Louisiana, -8°; Texas, -8°; Arkansas, -14°; and Florida, 10° above zero.

An outstanding feature was the extremely low temperatures in the deep South compared with much higher readings in some sections farther north. For example, the lowest for the month recorded at Washington, D. C., was 7° above zero, while the lowest for Mississippi was 14° below zero.

PRECIPITATION FOR THE 6-MONTH PERIOD FROM AUGUST TO JANUARY, INCLUSIVE

Fig. 1 shows that the 6-month period from August 1939 to January 1940, inclusive, was decidedly dry throughout nearly the entire country. California, Nevada, Utah, and Arizona had more than normal precipitation, while Alabama and Florida had exactly the normal amounts. In all other States the 6-month totals were deficient, markedly so in most cases. No State in the Central Valleys and Great Plains had as much as three-fourths of normal precipitation for the period.

(Both from U. S. Weather Bureau Weekly Weather and Crop Bulletin for week ending February 13).

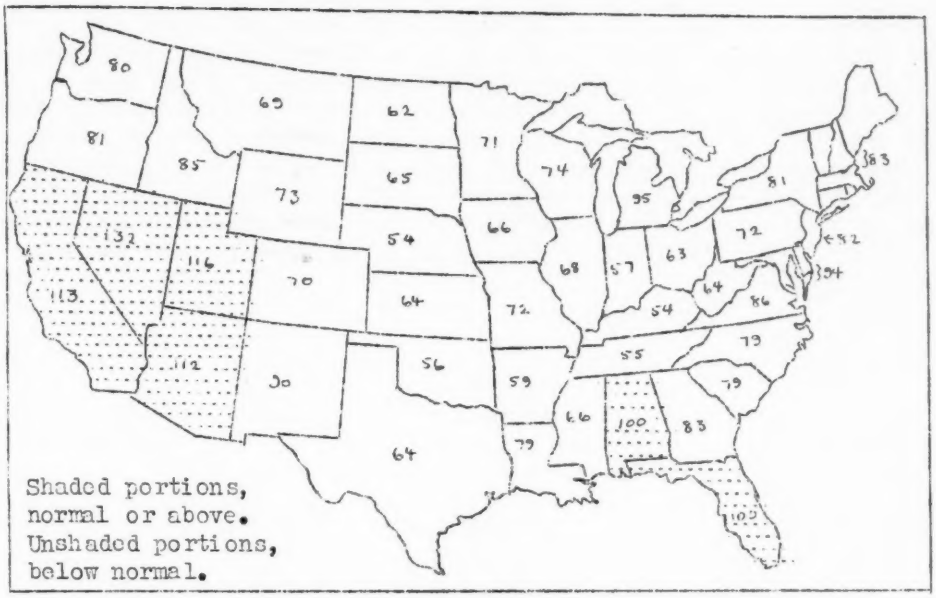

Fig. 1. Percentage of normal precipitation, by States, August 1939 - January 1940.

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VIEWPOINTS

"It is not without some misgivings that just at this time I should undertake to lay before the cotton planters of the State the results of this year's experiments in preventing the disease, and recommend a careful and intelligent trial, on a small scale the first year, in preventing it. For, considering the present over-production of cotton compared with the small production of food stuffs in the Southern States, it might seem an idle thing to do. Especially so since it has been several times suggested to me, by some who have looked at the matter hastily and superficially, that instead of desiring to know how to prevent the diseases of cotton now, we would do better to discover some new enemies of the plant. It is not likely such persons would view with alarm the destruction of a sufficiently large portion of the cotton crop to insure a good price provided they knew their own crop was secure and the yield would be abundant. But would they regard the matter in the same light if their own crop should be injured to the extent of 25 to 50 percent. while their neighbors produced full crops, even though the price of cotton should be low?

"The fair way to look at the matter is, that with the increasing competition in cotton culture through the increased acreage of the past few years and the constantly decreasing productiveness of many soils, we should take advantage of the results of research which show that judicious fertilizing, more careful preparation and cultivation of the land, proper means for preventing loss by disease and insects, will more than counterbalance the cost of their use. Those who endeavor to do these things well, and plant less cotton in order that they may do it well, and at the same time raise more of their own food stuffs, are the ones who will reach the greatest success in cotton culture in the future."--George F. Atkinson, 1892. (Some leaf blights of cotton. Alabama Agr. Expt. Sta. Bul. 36. Quoted from pp. 3-4).